

HOW DO EXPERIMENTS ON ANIMALS HELP US UNDERSTAND THE HUMAN BRAIN?

Scientists study animals like rats, mice, cats, dogs, sheep, and monkeys to learn more about the human brain. These experiments aim to understand how the brain works and what happens when something goes wrong.

▶ HOW DOES IT WORK?

In these studies, researchers damage specific parts of an animal's brain, a process called lesioning. This can involve starving the brain of oxygen or using chemicals to destroy

brain cells. Afterward, scientists observe how the damage affects the animal's behaviour, memory, or movement. Once the experiments are finished, the animals are usually killed.

▶ WHAT ARE THE BENEFITS?

Can target specific areas of an animal brain to lesion and observe what effect this has.

▶ WHAT ARE THE PROBLEMS?

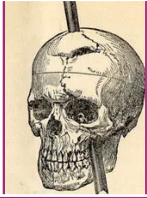
Animal brains are very different from human brains, so the results don't always apply to people.

Animals cannot demonstrate traits that are unique to humans, such as complex language.

On top of that, there are ethical concerns. Many people believe it's wrong to harm animals for experiments, especially when it causes pain or suffering. This has led to the development of better, kinder alternatives such as electrical stimulation.



HOW DO PATIENTS WITH BRAIN DAMAGE HELP US UNDERSTAND THE BRAIN?

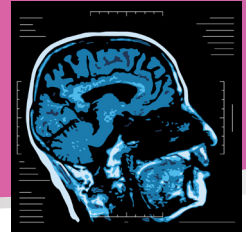


In 1848, Phineas Gage survived an extraordinary accident when an iron rod blasted through his skull, destroying part of his left frontal lobe. Although he lived, Gage's personality changed drastically - he became less socially aware and more impulsive. The case helped scientists discover that the left frontal lobe plays a big role in reasoning and social behaviour.

▶ HOW DOES IT WORK?

People who suffer brain damage due to accidents or strokes can reveal the functions of different areas of the brain. We can compare the person's behaviour, memory, or abilities before and after the brain damage.

Modern brain imaging technologies, such as MRI scans, allow us to pinpoint the damaged areas. By observing what happens when they don't function properly, we can determine their function.



▶ WHAT ARE THE BENEFITS?

Studying brain injuries is valuable due to its direct relevance to humans.

If we want answers to questions about the human brain, we need to study the brains of humans and not other species.

▶ WHAT ARE THE PROBLEMS?

One major challenge is that scientists must rely on accidents or illnesses to study brain damage. They can't plan experiments to damage specific brain areas

Additionally, this method will only give data on damaged or diseased brains, which are not typical of how healthy brains work.

HOW CAN ELECTRICAL STIMULATION HELP US UNDERSTAND THE BRAIN?

Electrical stimulation has helped us understand a great deal about how the brain controls movement, behaviour, and thought. It is a valuable tool in neuroscience research.

▶ HOW DOES IT WORK?

Electrical stimulation sends a weak electrical current or magnetic field to stimulate specific areas. This stimulation creates electrical activity in the brain, helping researchers see how different parts work. When certain areas are stimulated, they cause specific responses.

For example, if the motor area is stimulated, it might cause the person to make an involuntary movement, such as an arm twitch.

It can be combined with brain imaging techniques to target specific areas of the brain. By targeting different areas, scientists can explore the role of each part of the brain.

▶ WHAT ARE THE BENEFITS?

It is brief, reversible, and completely harmless. It can be used to study both healthy and damaged brains. Brain imaging technology helps scientists stimulate very specific areas for more accurate results.

▶ WHAT ARE THE PROBLEMS?

The process can cause mild discomfort for the person being studied. However, it's generally well-tolerated and is a safe way to investigate brain function.



HOW CAN BRAIN IMAGING HELP US UNDERSTAND THE BRAIN?

Brain imaging has revolutionised the way we understand the brain, making it an important tool in medicine and neuroscience.

▶ HOW DO BRAIN SCANS WORK?

MRI scans use magnetic fields and radio waves to create detailed images of the brain's structure.

CT scans use x-rays fired from different angles to build a picture of the brain.

PET scans use a small amount of radioactive material to track activity in the brain and show how it is functioning.

These methods allow doctors and researchers to study the brain without needing surgery or other invasive procedures.



▶ WHAT ARE THE BENEFITS?

Brain imaging is non-invasive and safe for most people. It provides detailed images that can help identify problems, such as tumours or damage from strokes.

▶ WHAT ARE THE PROBLEMS?

A minor concern with MRI scans is that the radio waves can cause slight heating if a person is exposed for too long. However, scans are carefully controlled to keep them safe.